

CLAIMS

1. A film (2, 3), in particular an embossing film, a laminating film or a sticker film, comprising a carrier layer (21, 31) and a replication layer (23, 32)

characterized in that the film further has a layer (24, 33) of a liquid crystal material, which is applied to the replication layer (23, 32), and that a diffractive structure (27, 35) is embossed into the surface of the replication layer (23, 32), which is towards the layer (24, 33) of a liquid crystal material, for orientation of the liquid crystal material, said diffractive structure having at least two partial regions with different directions of orientation of the embossed structure.

2. A film as set forth in claim 1 characterized in that the diffractive structure has a region in which the orientation direction of the structure continually changes and which is coated with the layer of a liquid crystal material.

3. A film as set forth in claim 1 characterized in that the diffractive structure has mutually adjoining regions involving differing orientation directions, which are coated with the layer of a liquid crystal material.

4. A film as set forth in claim 1 characterized in that the diffractive structure (68) has a first region (62) for the orientation of liquid crystal material, which is covered by the layer (66) of a liquid crystal material, and that the diffractive structure (68) has a second region (61, 63) for producing an optical diffraction effect, in particular for producing a hologram.

5. A film as set forth in claim 4 characterized in that a polarization representation produced in the first region (62) and a holographic representation produced in the second region (61, 63) form a mutually supplementing representation.

6. A film as set forth in one of the preceding claims characterized in that the diffractive structure has a region in which the diffractive structure (51 through 55) is formed from a superimposition of a coarse structure for producing an optical effect with a fine structure of a higher spatial frequency for orientation of the liquid crystal material.

7. A film as set forth in claim 6 characterized in that the fine structure has a period of less than 400 nm.

8. A film as set forth in claim 6 characterized in that the spatial frequency of the fine structure is at least ten times higher than the spatial frequency of the coarse structure.

9. A film as set forth in one of claims 6 through 8 characterized in that the coarse structure is a light-scattering structure, in particular an isotropic matt structure with a period of between 500 nm and 1 µm.

10. A film as set forth in one of claims 6 through 8 characterized in that the coarse structure is a macrostructure with a spatial frequency of less than 300 lines per mm.

11. A film as set forth in one of the preceding claims characterized in that the diffractive structure has a region in which the diffractive structure is formed from a superimposition of a first structure for producing an optical effect with a second structure of greater profile depth for the orientation of the liquid crystal material.

12. A film as set forth in claim 11 characterized in that the profile depth of the second structure is at least 100 nm greater than that of the first structure, wherein the profile depth of the first structure is in particular of a value from the range of between 250 nm and 400 nm.

13. A film as set forth in one of the preceding claims characterized in that the layer of a liquid crystal material covers the diffractive structure in region-wise manner in a pattern configuration.

14. A film as set forth in one of the preceding claims characterized in that one of the layers and in particular the liquid crystal layer is of region-wise differing thickness.

15. A film as set forth in one of the preceding claims characterized in that color interplays are produced by targeted orientation variations in the structured layer.

16. A film (2, 3) as set forth in one of the preceding claims characterized in that the film has a protective lacquer layer (25, 34) which covers the layer (24, 33) of a liquid crystal material.

17. A film (8) as set forth in one of the preceding claims characterized in that the film (8) has a further layer (85) with a further optically effective diffractive structure (88).

18. A film (7) as set forth in one of the preceding claims characterized in that a further optically effective diffractive structure (762, 761) is embossed on the surface of the replication layer (73), which is remote from the layer (74) of a liquid crystal material.

19. A film as set forth in claim 17 or claim 18 characterized in that the further optically effective diffractive structure overlies the diffractive structure at least in region-wise manner.

20. A film as set forth in one of claims 8 through 10 characterized in that the further optically effective structure only partially covers the further layer or the replication layer.

21. A film as set forth in one of the preceding claims characterized in that the film has a thin film system (93) for producing color shifts by means of interference.

22. A film as set forth in claim 21 characterized in that the thin film layer system (93) overlies the diffractive structure (96) at least in region-wise manner.

23. A film as set forth in one of the preceding claims characterized in that the transfer film has a reflecting layer, in particular a metallic layer or an HRI layer.

24. A film as set forth in claim 23 characterized in that the reflecting layer is a partial layer.

25. An optical security element (11, 12; 4) for safeguarding banknotes, credit cards and the like, wherein the optical security element (11, 12; 4) has a replication layer (42), characterized in that the optical security element (11, 12; 4) further has a layer (43) of a liquid crystal material, which is applied to the replication layer (42), and that a diffractive structure (46) is embossed into the surface of the replication layer (42), which is towards the layer of a liquid crystal material, for orientation of the liquid crystal material, said diffractive structure having at least two partial regions with different directions of orientation of the embossed structure.

26. An optical security element as set forth in claim 25 characterized in that the optical security element is a two-part security element, wherein a first partial element (11) has the replication layer and the layer of a liquid crystal material and the second partial element (12) has a polarizer for checking the security feature produced by the layer of a liquid crystal material.

27. An optical security element as set forth in claim 25 characterized in that the optical security element is a two-part or multi-part security element comprising two or more partial elements, wherein both a first partial element and also a second partial element has a layer of a liquid crystal material which is applied to a replication layer into which

a diffractive structure for orientation of the LCP material is embossed and which has at least two partial regions with different orientation directions in respect of the embossed structure, and that the second partial element serves for checking of the security feature produced by the first partial element.